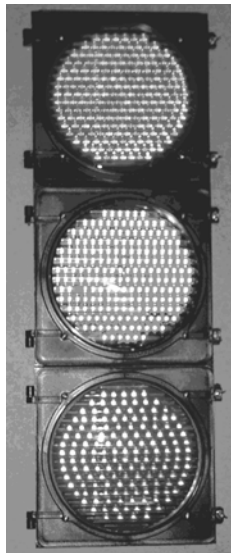


LIGHT EMITTING DIODE (LED) TRAFFIC SIGNAL SURVEY RESULTS



STAFF REPORT

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Arnold Schwarzenegger, Governor

CALIFORNIA ENERGY COMMISSION

Merry Bronson
Principal Author

Merry Bronson
Project Manager

John Sugar
Manager
Public Programs Office

Valerie Hall
Deputy Director
**Energy Efficiency and
Demand Analysis Division**

Robert L. Therkelsen
Executive Director

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Artesia	Danville	La Habra Heights	Moorpark
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Calistoga	Firebaugh	Livermore	Pacific Grove
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Citrus Heights	Half Moon Bay	Marina	Pleasant Hill
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Commerce	Hillsborough	Mill Valley	Poway
Concord	Hollister	Millbrae	Rancho Cordova

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San Fernando	Stockton	Butte County	Sutter County
San Francisco	Susanville	Calaveras County	Trinity County
San Gabriel	Taft	Contra Costa County	Tulare County
San Jose	Temecula	El Dorado County	Tuolumne County
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California Energy Commission Light Emitting Traffic Signal Survey Results

Executive Summary

Introduction

In April 2004, the California Energy Commission (Energy Commission) conducted a ***Light Emitting Diode (LED) Traffic Signal Survey*** to determine the current penetration of LED traffic signal modules in California. A traffic signal module is the individual 8-inch (200 mm) or 12-inch (300 mm) round traffic signal or the pedestrian signal. A module consists of the light source, lens, and all parts necessary for operation. Modules come in red, amber, and green colors for the round indications, and white/Portland orange for the pedestrian signals.

In addition to determining the penetration of LED traffic signal modules, the Energy Commission wanted to know: a) the respondent's level of awareness regarding California's new traffic signal standard, b) the bid specifications used for their LED modules, c) where they purchased their traffic signal modules, d) their experience with LEDs, and e) any reasons for not converting their traffic signals to LEDs.

A total of 537 surveys were sent to the cities and counties in California and to the California Department of Transportation (CalTrans). One survey was sent to each jurisdiction's Director of Public Works, Engineer and/or Maintenance Department. Surveys were sent and returned via electronic mail or fax.

Summary of Results

This survey is a follow-up to a traffic signal survey taken in April 1999. Compared to 1999, there are now more jurisdictions that have installed LED traffic signal modules. In fact, our survey indicates that there are now 61 jurisdictions (23 percent of the responding jurisdictions) that have installed all LED traffic signal modules. An additional 59 jurisdictions have plans to install them in the future. About 73 percent of the jurisdictions reported that they have installed some LED modules and three percent indicated no LED installations. This is a sharp contrast to 1999, when about 57 percent of the jurisdictions reported that they had no LED installations. Thus, we have seen a major increase in implementation in just five years.

A total of 302 surveys were returned. This is an overall return rate of 56 percent. About 82 percent of the state's population is represented by the returned surveys.

Major findings from the survey indicate:

- 65 percent of the traffic signal modules in California are LEDs, with the red and green being the predominant types, constituting nearly 80 percent of the LED module types installed.
- 76 percent of those surveyed indicated that their LED traffic signals have reduced utility bills.
- 56 percent of those surveyed reported that the LED modules have reduced their maintenance cost. Three jurisdictions specifically reported no maintenance savings.
- Though most have converted some of their traffic signals to LEDs, only 30 percent (59) have plans to convert the remaining ones to LEDs and 43 percent indicated no plans unless funding is available. The remaining 27 percent did not specify whether they do or do not have plans.
- More than half of the survey respondents indicated that they knew about the state's traffic signal standard. The remainder either did not know about the standards or did not respond. Those that had not installed any LED traffic signal modules tended to be less knowledgeable about the standards.
- The most desired service that the Commission can offer is to provide funding (grants or rebates) for LED traffic signal conversions and other types of energy efficiency projects.

Next Steps

Commission Services

About 145 respondents identified energy-related services that they would like to see the Energy Commission provide to local governments. Some of these services are already within our existing program scope, and we will follow-up on their request by contacting and mailing them information. Examples include:

- Loans for purchasing and installing energy efficiency and distributed generation equipment.
- Assistance in identifying energy saving opportunities in their buildings and facilities, such as energy audits and feasibility studies.
- Assistance in identifying new street lighting technologies that can reduce energy cost in their facilities.

There were other requests for services that could be considered only if funding and technical resources become available in the future. These include grants for battery backup systems and other energy saving technologies, and studies of LED traffic signal module performance and lumen degradation over time.

Information Requests

There were 749 requests for additional information on Commission programs. The most requested items, in priority order were: a) information on Energy Commission programs for local governments, b) the energy efficiency standards for traffic signals, c) the results of the survey, and d) Commission loans for LED traffic signals and other projects.

Energy Commission staff has already sent information to all jurisdictions on the current traffic signal standard and the proposed standard for the pedestrian signals. We will follow-up on the remaining requests by contacting and mailing them information.

Survey Results

The survey consisted of 12 questions. The following sections will address the responses received for each question. A copy of the survey is contained in Appendix A.

If you have questions or would like more information regarding the survey results, please contact Merry Bronson at 916-654-4104.

ITEM 1: WHO RESPONDED TO THE SURVEY?

RESPONSE RATE

A total of 537 surveys were sent out to California cities, counties and to CalTrans Headquarters in Sacramento. A total of 302 surveys were returned. This is an overall return rate of 56 percent [302/537]. The following table and figure summarizes the survey response rate.

City Return Rate: 479 surveys were sent to cities. 264 cities returned their surveys. This is a return rate of 55 percent [264/479] and represents 87 percent [264/302] of all surveys returned.

County Return Rate: 57 surveys were sent to counties. 37 counties returned their surveys. This is a return rate of 66 percent [37/57] and represents 12 percent [37/302] of all surveys returned.

CalTrans Headquarters: 1 survey was sent. 1 survey was returned. This is a return rate of 100 percent.

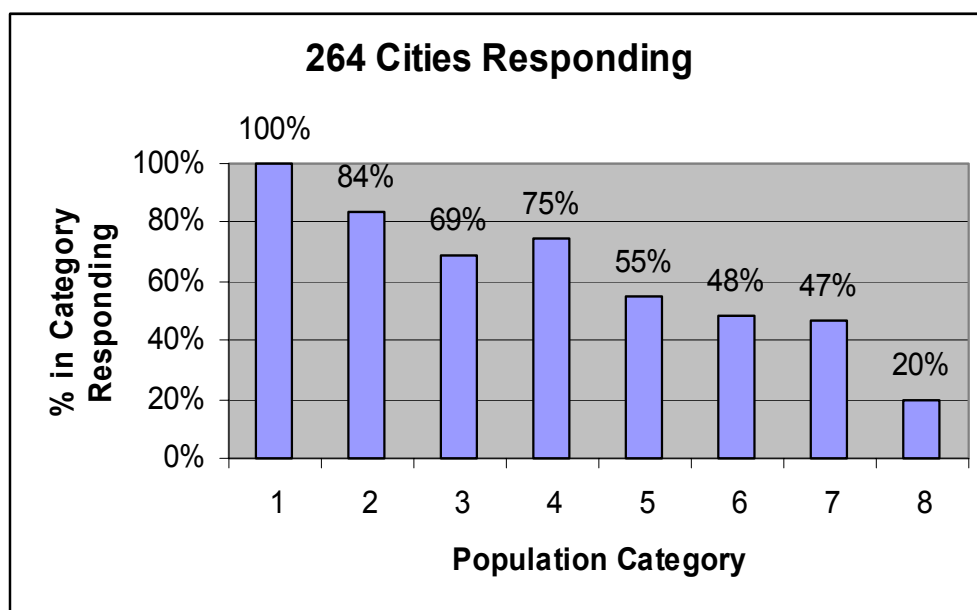
82 percent of California's population is represented by the returned surveys.

CITY POPULATION RETURN RATE

The responding cities were segregated into eight categories according to population. The following table and graph show the response rate based on each category of population. Cities with populations between 25,000 and 500,000 represented about 65 percent of the survey responses. The fewest responses were from cities with a population of less than 5,000.

Population range numbers are for graphs below	1	2	3	4	5	6	7	8	
CITIES	Pop. >500000	Pop. 499999 to 100000	Pop. 99999 to 75000	Pop. 74999 to 50000	Pop. 49999 to 25000	Pop. 24999 to 10000	Pop. 9999 to 5000	Pop <5000	Totals
# responding	4	46	22	45	56	51	28	12	264
# not responding	0	9	10	15	46	55	32	48	215
Grand Total									479

The following graph reflects the percentage of cities responding to the survey within each of the eight population ranges relative to 264 responses. For instance, 55 percent of the cities in the 25,000 through 49,999 population range responded to the survey.

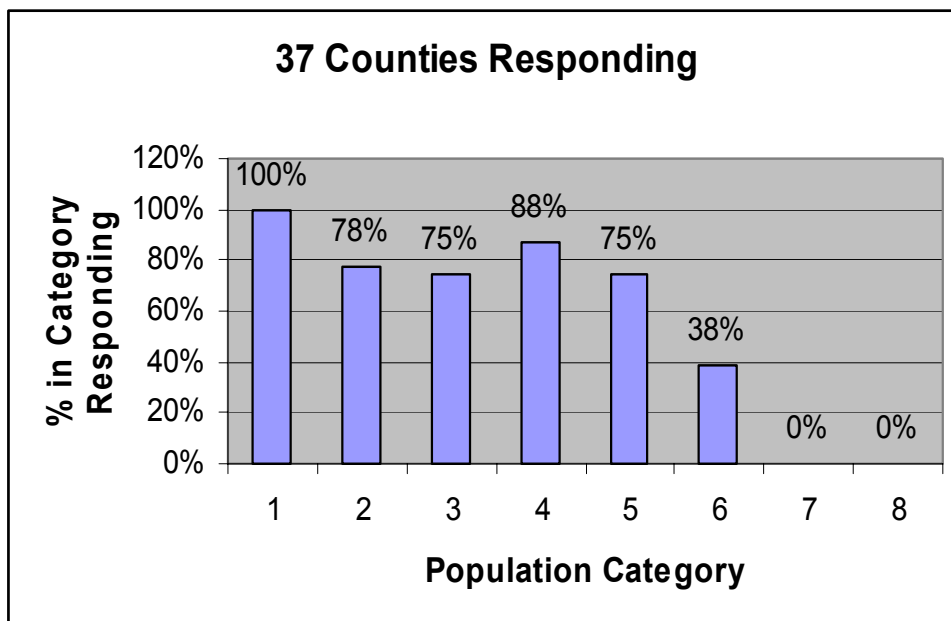


COUNTY POPULATION RETURN RATE

The population of responding counties was segregated into eight categories. To avoid double accounting with city populations, only the unincorporated county population was used in the following table and graph. Unincorporated county populations greater than 25,000 represented about 85 percent of the survey responses. The fewest responses were from counties with an unincorporated population of less than 10,000.

Population range numbers are for graphs below	1	2	3	4	5	6	7	8	
COUNTIES Unincorporated Population	Pop. >50000	Pop. 49999 to 100000	Pop. 9999 to 75000	Pop. 74999 to 50000	Pop. 49999 to 25000	Pop. 24999 to 10000	Pop. 9999 to 5000	Pop. <5000	Totals
# responding	2	14	3	7	6	5	0	0	37
# not responding	0	4	1	1	2	8	4	0	20
Grand Total									57

The following graph reflects the percentage of counties responding to the survey within each of the eight population ranges relative to the 37 responses. For instance, 78 percent of the counties in the 100,000 through 499,999 population range responded to the survey.

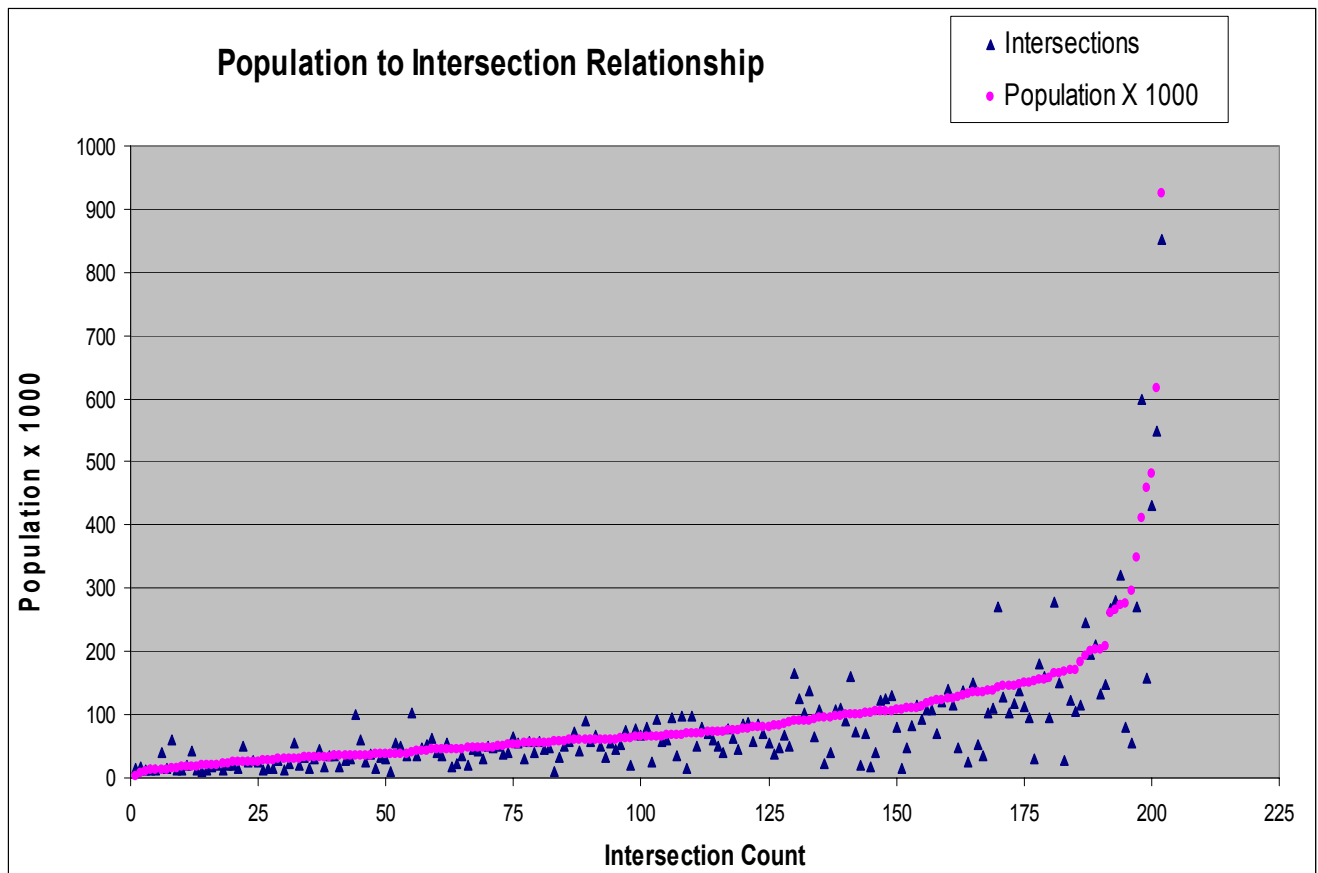


ITEM 2: TRAFFIC SIGNAL INTERSECTIONS

Approximately how many traffic signal intersections does your city/county own and maintain (excluding CalTrans intersections)?

The survey reported 26,955 intersections (4500 of this number of intersections are maintained by CalTrans). Past information from state transportation experts indicated that CalTrans represented about 10 percent of all signalized intersections in California. This means that the total number of intersections in California would be 45,000. The results from this survey suggest that the total number of signalized intersections is significantly less than 45,000.

The following figure compares the number of intersections relative to the population. It shows a strong correlation between population and the number of intersections. The sample correlation coefficient is 0.94, indicating a high correlation between populations and intersections.



Based on the data, there is an average of 85 intersections per jurisdiction, excluding the 4500 CalTrans intersections, those reporting “zero” intersections [35 reported 0] and/or declining to give information [3 declined].

ITEM 3: TYPES OF TRAFFIC SIGNAL MODULES

Please tell us about your traffic signals by completing the following table.
Column 1: estimate the number of each module type (Incandescent and LED).
Column 2: estimate what percentage of each module type are LEDs.

This table does not include the 35 surveys that reported “zero” intersections in calculating the percentages. The total number of jurisdictions with intersections is 266.

The respondents reported the number and type of modules (“Number of Module Type”) and the percent that are LEDs (“% LED Modules”). Based on this information staff calculated the “Number of LED Modules” and “% Non-LED Modules”.

TRAFFIC SIGNAL MODULE TYPE	NUMBER OF MODULE TYPE	NUMBER OF LED MODULES	% LED MODULES	% NON-LED MODULES
12 inch red ball	182,354	148,523	81	19
8 inch red ball	116,996	82,390	70	30
12 inch red arrow	58,511	53,174	91	9
Red flasher	683	484	71	29
TOTAL REDS	358,844	284,571	79	21
12 inch green ball	173,583	136,607	79	21
8 inch green ball	94,804	65,231	69	31
12 inch green arrow	70,329	58,776	84	16
Green flasher	0	0	0	0
TOTAL GREENS	338,716	260,614	77	23
12 inch amber ball	172,129	71,940	42	58
8 inch amber ball	105,385	41,803	40	60
12 inch amber arrow	61,965	34,329	55	45
Amber flasher	2,532	1,630	64	36
TOTAL AMBERS	342,011	149,702	44	56
TOTAL MODULES (W/O peds)	1,039,271	694,887	67	33

Pedestrian Hand/Man	155,532	99,428	64	36
Pedestrian: Neon	18,109	0	0	100
TOTAL PEDESTRIAN	173,641	99,428	57	43

GRAND TOTAL MODULE COUNT REPORTED	1,212,912	794,315	65%	35%
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Cities and Counties That Have Installed 100% LEDs

About 23 percent of the responding jurisdictions with intersections reported that they have installed all LED modules for red, green and amber balls, arrows, and flashing beacons (if applicable). The following is a listing of the 61 cities and counties reporting all LED modules:

Alameda	Hollister	Redondo Beach
Bakersfield	Irwindale	Rialto
Bell Gardens	La Verne	Riverside
Belmont	Lake Forest	Roseville
Brisbane	Livermore	San Francisco
Buena Park	Lodi	San Marcos
Carpinteria	Lompoc	San Marino
Carson	Millbrae	Sebastopol
Ceres	Milpitas	Temple City
Chico	Monrovia	Villa Park
Citrus Heights	Montclair	Westlake Village
Claremont	Monterey	El Dorado County
Commerce	Moorpark	Kern County
Culver City	Mountain View	Los Angeles County
Desert Hot Springs	Pacifica	Madera County
Fontana	Palo Alto	Marin County
Fountain Valley	Piedmont	San Bernardino County
Glendale	Poway	Santa Clara County
Grand Terrace	Rancho Santa Margarita	Solano County
Gridley	Redding	
Healdsburg	Redlands	

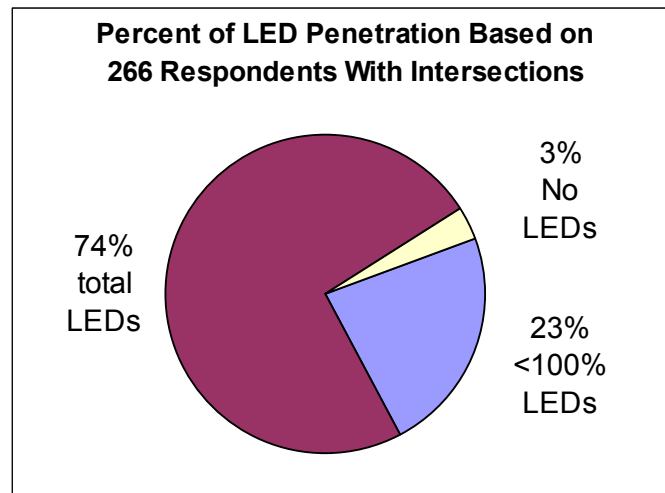
Twenty-six of the 61 above listed communities indicated that they were unaware of the State's energy efficiency standards for traffic signal lamps and modules.

Cities and Counties with Some LED Traffic Signal Installations

About 73 percent of the jurisdictions responding to the survey reported having installed less than 100 percent LEDs. This translates to 195 jurisdictions. The percent of LED installations varied from those with a few LEDs (less than 10 percent of all traffic lights) to those that were all LEDs for red and green modules, but not for amber or the pedestrian signals. The following are some additional breakdowns for this group:

- 113 jurisdictions reported 100 percent LED red balls (12 and 8 inches), red arrows, green balls (12 and 8 inches) and green arrows (excludes beacons), but not 100 percent ambers.
- 19 jurisdictions in addition to the 113 cited above reported 100 percent LED red balls (12 and 8 inches) and red arrows (excludes beacons) but not 100 percent of greens or ambers.

- 4 jurisdictions in addition to the 113 cited above reported 100 percent LED green balls (12 and 8 inches) and green arrows (excludes beacons) but not 100 percent reds or ambers.



Cities and Counties with No LED Traffic Signal Installations

About three percent of the respondents with intersections reported that they had not installed any LEDs. This translates to about 10 jurisdictions. These 10 jurisdictions tended to be small, with an average of four intersections and an average population of 13,000. Only one of these jurisdictions indicated plans to install LEDs within 2 years. The remainder had no plans and only a few were aware of the state regulation for traffic signals. Many indicated that lack of funding is the main reason for not converting to LEDs.

Compared to 1999, there are now more jurisdictions that have installed some LED traffic signal modules. Those without any LED installations are small relative to those with some LEDs. In 1999, about 57 percent indicated no LED installations. Our 2004 survey indicates that the percentage has decreased to three percent. This represents a major implementation jump in only five years.

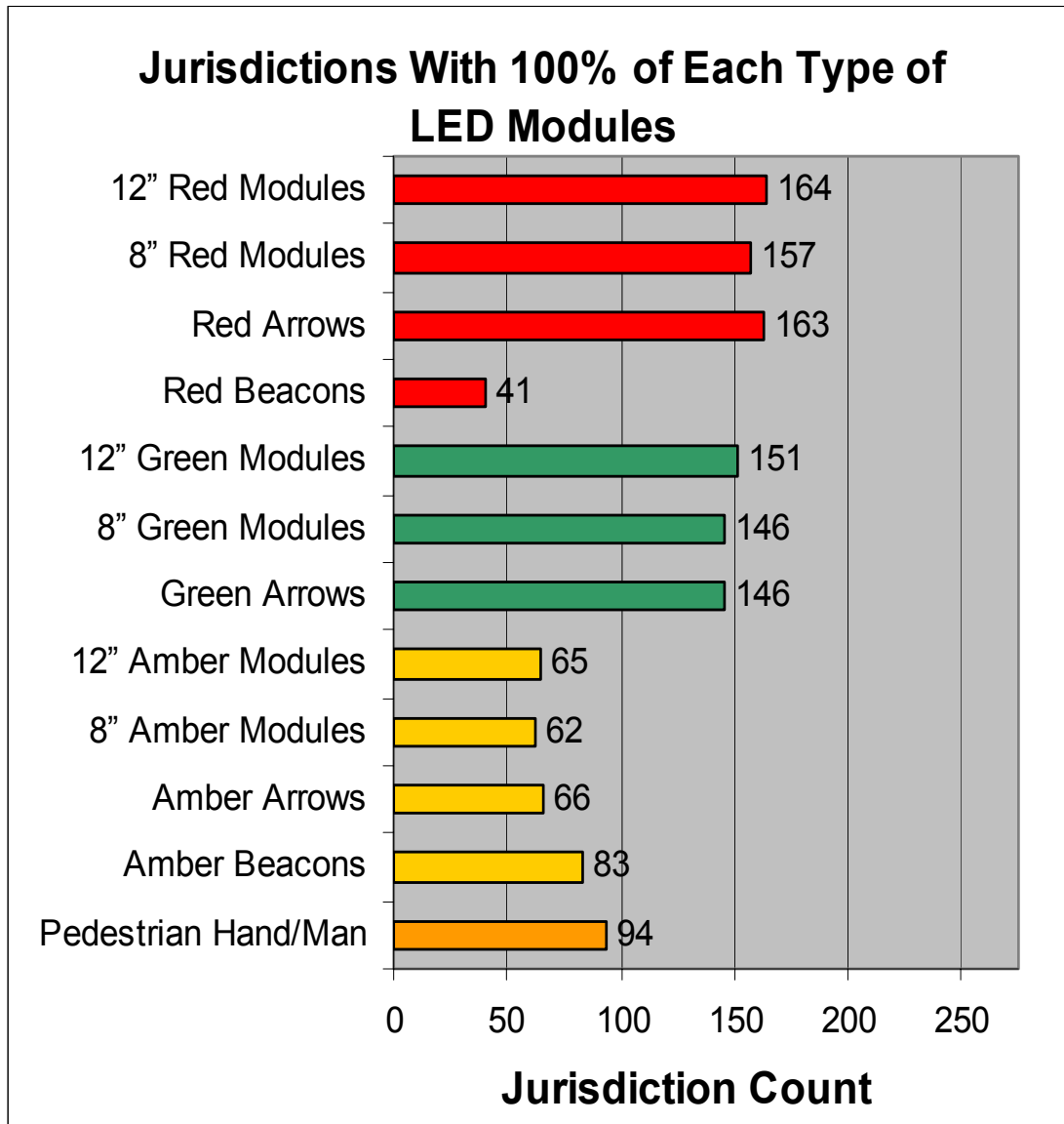
Cities and Counties with No Intersections

35 jurisdictions reported that they had no intersections and did not report any traffic signals. These jurisdictions were not included when calculating the percentage of LED installations.

Jurisdictions with 100 Percent of Each Type of LED Modules

The following figure shows the number of jurisdictions that have converted their traffic signals to 100 percent LED modules by color and type.

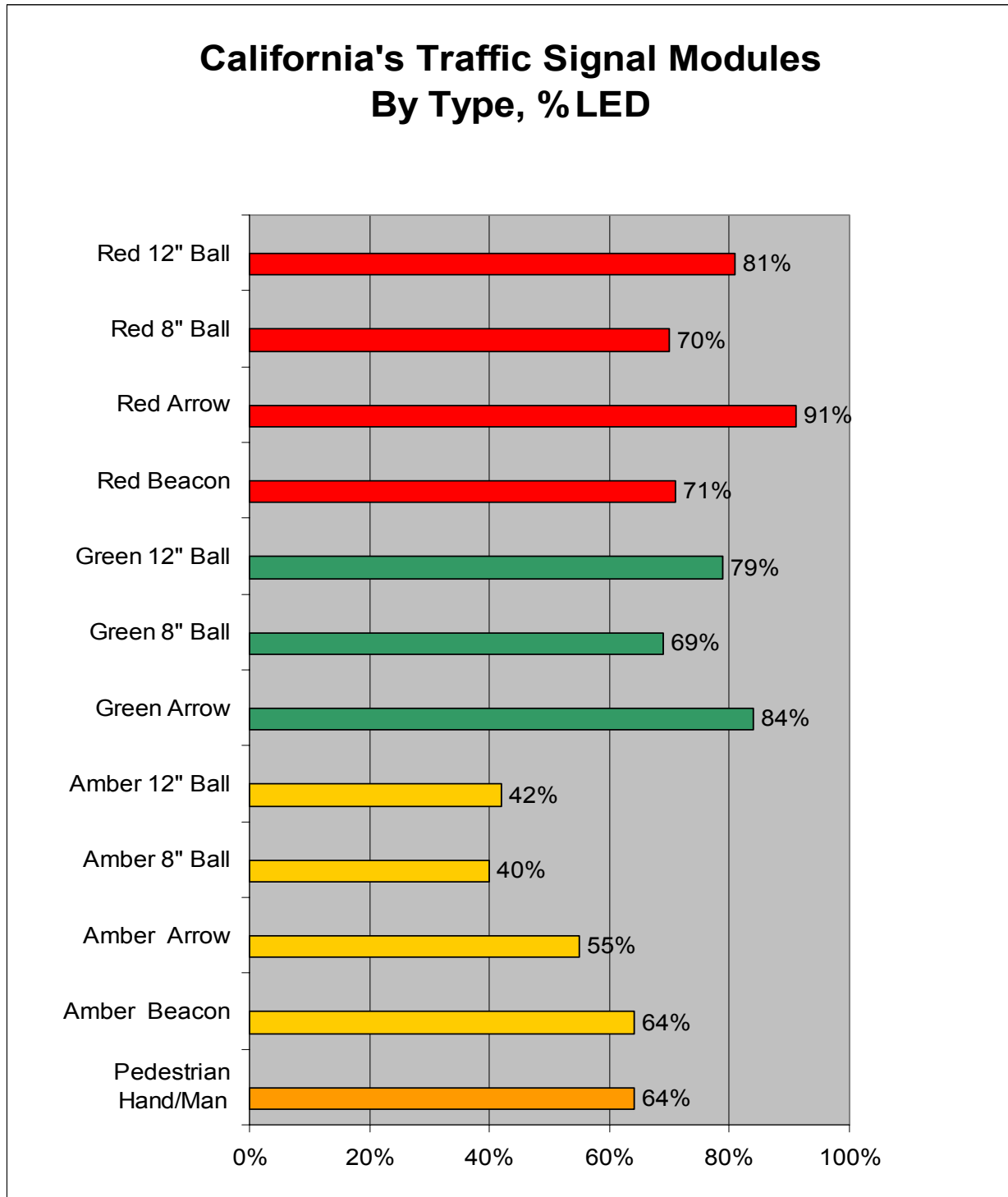
266 Responses



Percentage of LED Traffic Signals by Type

The following figure shows the percentage of red, green, amber and pedestrian modules that are LEDs. About 80 percent of the 12 inch red and green modules have been converted to LEDs and about 40 percent for the amber modules.

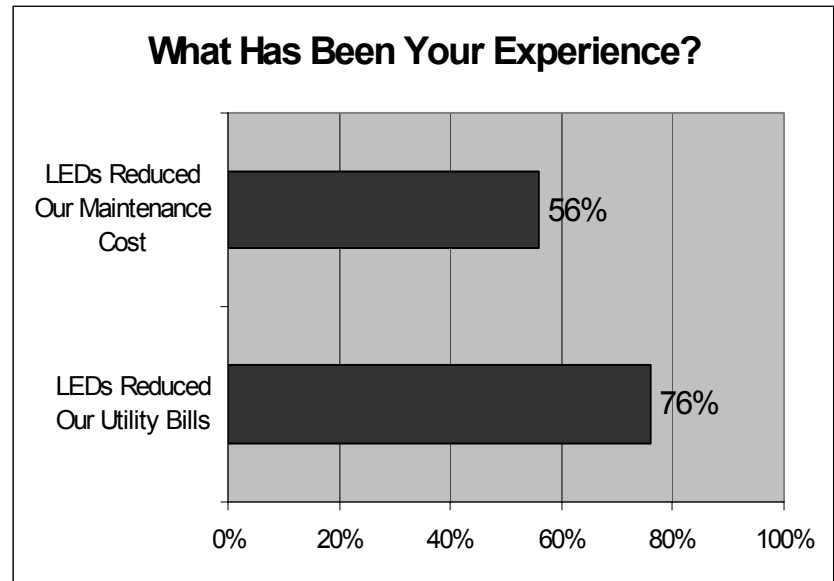
266 Responses



ITEM 4: LED EXPERIENCE

If you have converted some or all of your traffic signals to LEDs, what has been your experience? Check all that apply.

About 76 percent of those responding to the survey indicated that installing LED traffic signal modules has reduced their utility bills, and 56 percent indicated that these installations have reduced their maintenance costs. However, three jurisdictions indicated that the maintenance cost had not been reduced. In the Energy Commission's 1999 survey, reduction in utility bills and maintenance cost were the main reasons cited by respondents for converting to LEDs.



About 37 percent of the respondents noted that an average 12 percent of their LEDs burned out early—generally in less than five years. The LEDs will need to be replaced in about five years due to lumen degradation according to 19 percent of the respondents.

The following are the specific responses to each question:

☒ **The LED modules have reduced our utility bills.**

230 checked this box (translates to 76 percent of surveys returned)

72 did not respond to this question.

☒ **The LED modules have reduced our maintenance costs.**

170 checked this box (translates to 56 percent of surveys returned)

132 did not respond to this question.

3 stated they had no savings from maintenance cost.

☒ **Estimated percentage of LED modules that have burned out early:**

112 responded (respondents indicated that on average, 12 percent of the LEDs burned out early, e.g., within the warranty period)

190 did not respond to this question.

☒ **Estimated age of LEDs needing replacement**

34 responses (average estimate of 5 years until LEDs need replacement)
268 did not respond to this question.

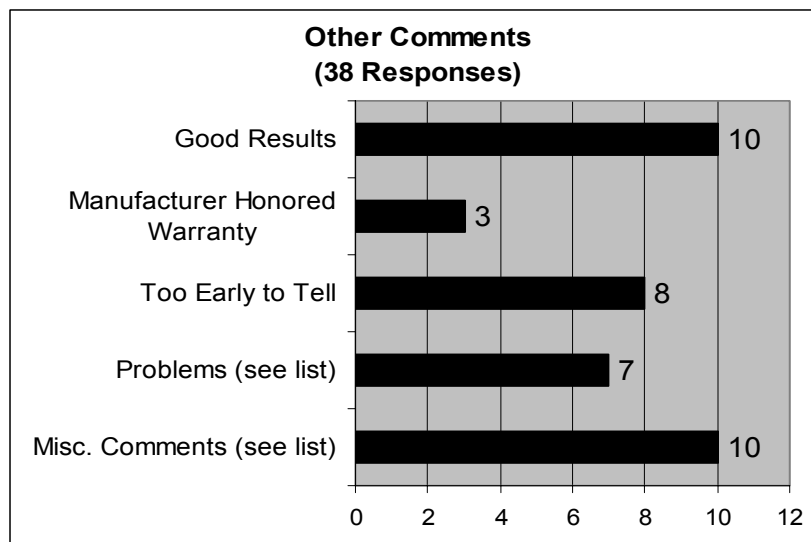
☒ **The light intensity of the LED modules is decreasing and we anticipate the need to replace them in _____ years.**

57 responses (average 4.5 years life expectancy due to light intensity decrease)
245 did not respond to this question.

☒ **Color of LEDs needing early replacement:**

29 responses (early replacement: 22 said red, 8 said green, 3 said amber)
273 did not respond to this question

☒ **Other Comments** - The following chart summarizes other comments made regarding experience with LEDs (38 responses).



Some example of problems and comments cited include:

- The consistent failure of bulbs led to unusual patterns in the signal lens.
- LED failure was due to power supply problems.
- LEDs have not reduced maintenance cost.
- Maintenance costs remain the same but can increase as LED's go out of warranty. More costly to replace than non-LED bulbs.
- The first batch of LEDs had problems.
- We experienced as many lamp outages with the LEDs as we did with the incandescents.
- Estimated age and color of LEDs needing replacement: varies with type of LED, early types do not last as long. A large purchase and installation in a short period guarantees a large purchase and installation of replacement LEDs in the future. However, early replacement of about 20 percent each year, for five years, spreads the cost.

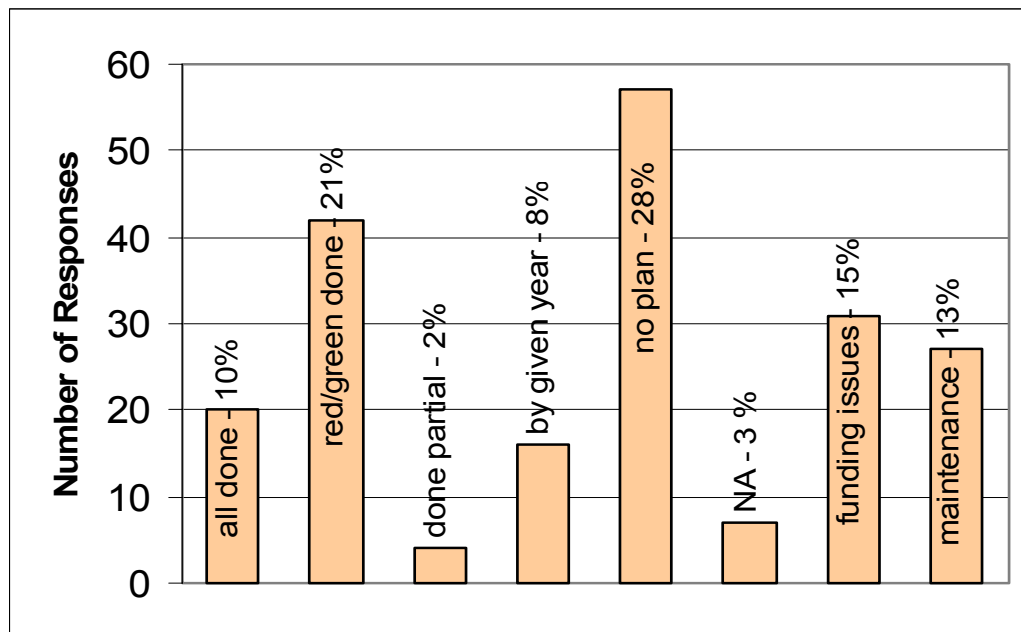
- On going LED replacement on a four year cycle.
- LED replacement plan of 15 intersections per fiscal year.
- We plan to replace our reds in three years; all others in five years.
- The installation occurred over a three year period to avoid a mass replacement in the future. The LEDs are a great benefit to the city in terms of energy use reduction and maintenance cost.

ITEM 5: PLANS FOR CONVERTING TO LEDS

If you have not converted any or all of your traffic signals to LEDs, what are your plans for converting them in the future (i.e. do you have a schedule to do LED retrofits, what colors/type modules do you intend to install)?

We received 204 responses. The following is a summary of those responses:

- 28 percent indicated that they had no plans for converting their traffic signals to all LEDs. Most in this category have already converted some of their traffic signals to LED modules. (57 cities/counties)
- 13 percent indicated that, as traffic signal bulbs burn out, they plan to convert to LEDs as a part of their maintenance activities. (27 cities/counties)
- 21 percent indicated that they had already converted their red and greens to LEDs and they plan to convert their ambers or pedestrian signals to LEDs (4 cities/counties)
- 15 percent indicated that they had no funding to convert some or all of bulbs to LED modules. Amber and pedestrian signals were the most frequently mentioned bulb not being converted due to lack of funding. (31 cities/counties)
- 10 percent indicated that they have converted all their bulbs to LED modules. (20 cities/counties)
- 8 percent had plans to convert some or all of their bulbs to LED modules by a certain date (16 cities/counties)
- 3 percent said that the question was not applicable because they had either converted all their bulbs to LED modules or had already converted some, and had no plans to do anymore (7 cities/counties)
- 2 percent said they had converted some of their modules to LEDs. (4 cities/counties)



ITEM 6: SOURCE OF TRAFFIC SIGNAL MODULES

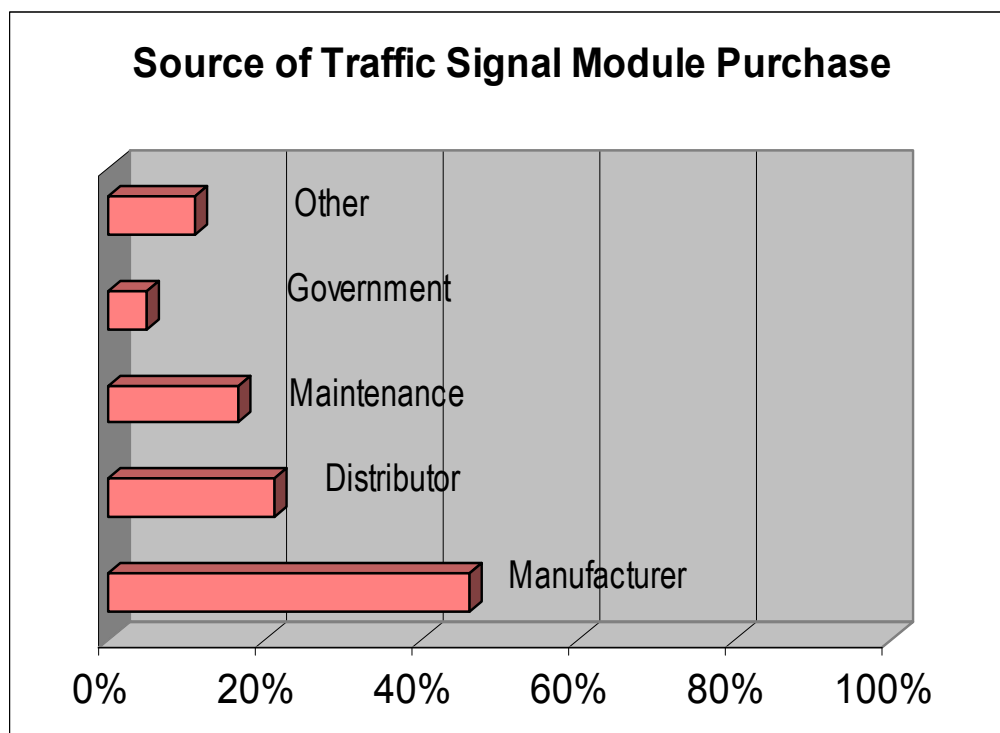
Who do you purchase your traffic signal modules from?

Over 40 percent of the respondents purchase their LED traffic signal modules and bulbs directly from manufacturers. About 20 percent purchase their traffic signal modules (both LED and non LEDs) from electrical distributors and about 17 percent from traffic signal maintenance companies. Less than 10 percent of the respondents purchase traffic signal modules from governmental agencies, such as CalTrans, and other cities and counties. In some cases, local jurisdictions may contract with other governmental agencies for traffic signal maintenance.

In the Energy Commission's 1999 survey, about 40 percent of the jurisdictions contract with private companies to maintain their traffic signals. Based on the results of the 2004 survey, it appears that many local jurisdictions purchase their modules and bulbs directly, and then contract with a maintenance company do the installation.

The following chart shows where jurisdictions purchase their traffic signal modules. The "Other" category represents those responses that were too vague to be placed in one of the other categories. Examples of these responses are "low bid" or "multiple vendors."

We received 240 responses.



ITEM 7: TRAFFIC SIGNAL MODULE SPECIFICATIONS

What traffic signal module specifications do you use?

Local jurisdictions generally use standard specifications prepared by CalTrans or the Institute of Transportation Engineers (ITE). These specifications identify the minimum physical, mechanical, electrical and operating requirements for the LED modules. These specifications are part of the bid package for the traffic signal modules and to ensure consistency of bids. Some specifications also include the maximum wattage for each type of LED module and the minimum warranty period.

About 80 percent of the respondents - or 230 jurisdictions - indicated that they used the CalTrans specifications. About 15 percent - or 42 jurisdictions - used the ITE specifications.

About 5 percent of the respondents -16 jurisdictions - use other specifications. Some may use their own specifications.

ITEM 8: BATTERY BACKUP SYSTEMS

How many of your intersections have a battery backup system?

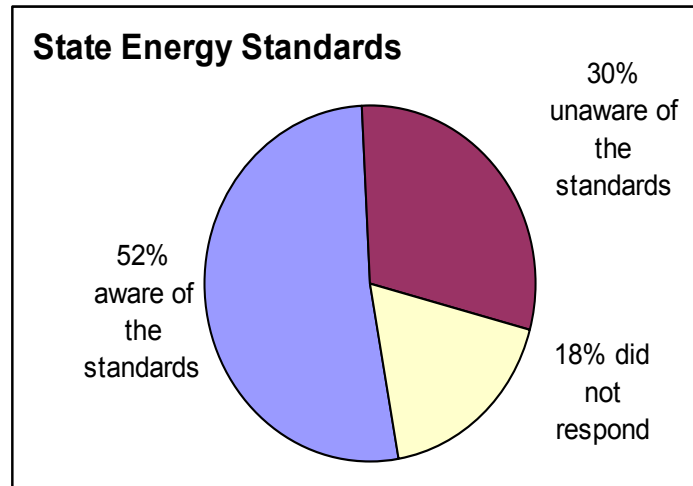
While LED traffic signals are far more efficient than traditional incandescent traffic signals, they still require electricity to operate. When power outages occur, even LED traffic lights become non-functioning. This results in accidents and traffic congestion. To alleviate this problem, many local jurisdictions installed battery backup systems. These systems would be installed in the traffic control cabinet located at the intersection or in an adjacent cabinet. When a power outage occurs, the battery backup system works in conjunction with the controller to either operate the red signal in flash mode or to operate all the signals in the fully functional mode. The mode depends on whether some or all of the traffic control signals are converted to LEDs. The viability of using battery backup systems was made possible only if the intersections already contained LED traffic signals.

According to our survey, 259 jurisdictions reported that they had battery backup systems installed on 9,036 intersections. This translates to 34 percent of the reported intersections have battery backup systems. Many jurisdictions reported that intersections with battery backup systems were often all LED.

ITEM 9: STATE ENERGY STANDARDS

The Energy Commission adopted energy efficiency standards for traffic signal modules and lamps. These standards set minimum efficiencies for products that may be sold in California. They limit sales of new modules and lamps, manufactured on or after March 1, 2003, to certified, energy efficient products (mainly LEDs). Are you aware of the standards?

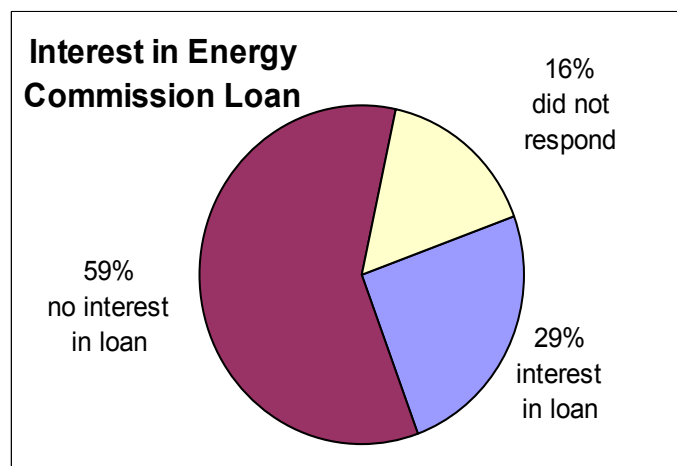
Of the 302 responses received:



ITEM 10: LOANS

Are you interested in an Energy Commission loan (currently 3.95 percent interest rate) to finance energy saving projects, such as LED traffic signals and battery backup systems?

Of the 302 responses received:



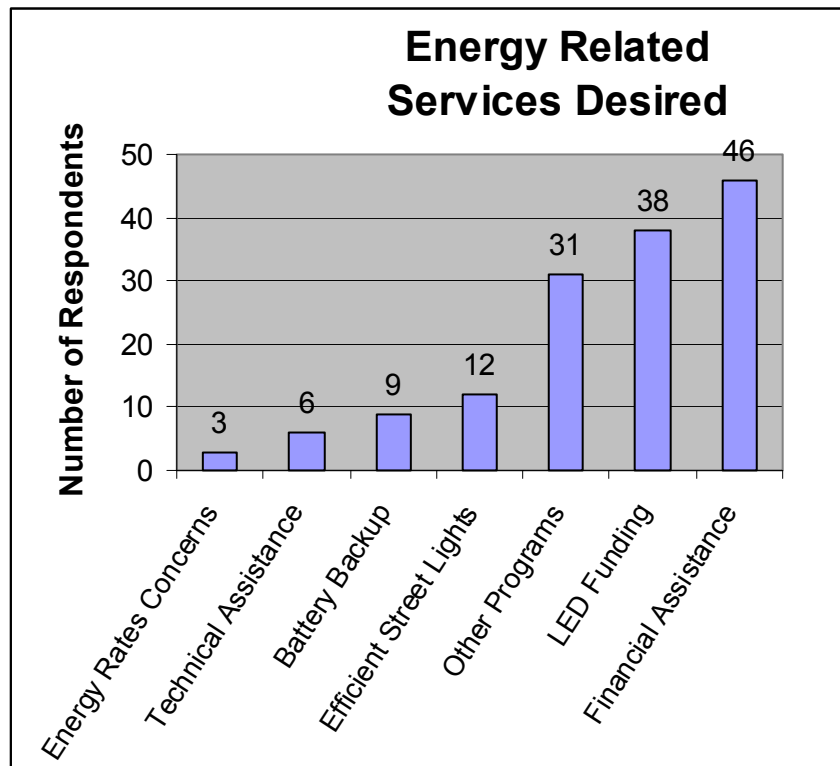
ITEM 11: ASSISTANCE NEEDS

What energy related services or assistance would you like to see the California Energy Commission provide to local governments?

The following is a summary of the 145 responses:

- **Grants, rebates or funding for the purchase and installation of LED traffic signal modules.** About 26 percent of the respondents - or 38 local jurisdictions - wanted funding assistance for LED traffic signal modules. Some indicated that without grants or government funding it would be difficult to finance changing the remaining traffic signals to LEDs. About 42 percent of the local jurisdictions that had not installed any LEDs indicated that lack of funds was the main reason for not converting to LEDs.
- **Grants, rebates or funding for other energy efficiency projects.** About 32 percent of the respondents - 46 local jurisdictions - wanted grants, rebates or funding for streetlights and other types of energy efficiency projects.
- **Energy efficiency and other programs.** About 20 percent of the respondents - or 28 local jurisdictions - wanted the Commission to have other types of energy efficiency or generation programs. Examples include ways to make water and wastewater treatment facilities more efficient, analysis of LED traffic signal module performance and lumen degradation, use of alternative energy including micro turbines, and implementation of traffic safety studies.
- **Streetlight program.** About 8 percent of the respondents - or 12 local jurisdictions - wanted the Commission to have an energy efficient streetlight program that would identify new technologies and ways to reduce energy cost.
- **Battery backup program.** About 6 percent of the responses - or 9 jurisdictions - wanted the Commission to provide funding for battery backup systems for traffic lights.
- **Technical assistance.** About 4 percent of the responses - or 6 jurisdictions - requested technical assistance in evaluating energy saving opportunities in their facilities.
- **Electric rates.** About 2 percent of the responses - or 3 jurisdictions - had comments about their electric rates, such as they wanted lower rates and special rate considerations.

See bar graph of the above information on the following page.



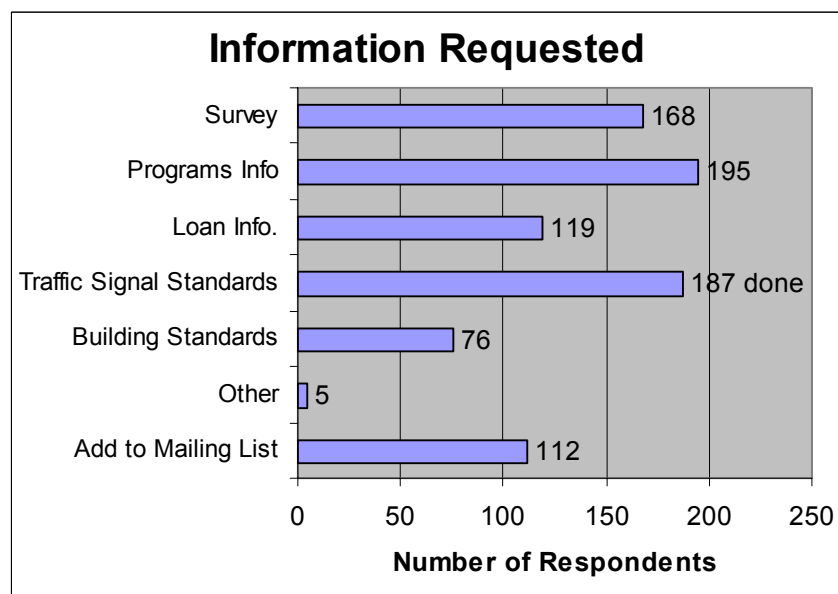
ITEM 12: INFORMATION REQUESTED

Please check any of the following items that you would like us to send you free of cost:

The most requested item was information on the Commission's programs for local governments and the energy efficiency standards for traffic signals (Title 20). The following chart provides a breakdown of the requested items:

862 Responses

- Results of the survey (168 requested)
- Information on Energy Commission programs for local governments (195 requested)
- Information on Energy Commission loans for LED traffic signals and other projects (119 requested)
- Energy efficiency standards for traffic signals (Title 20) (187 requested)
- Energy efficiency standards for buildings (Title 24) (76 requested)
- Other: five other requests were made (see following page for a list of these)
- E-mail my requested item(s). (167 requested)
- Send my requested item(s) by mail. (85 requested)
- Add me to your mailing list for future notification of Energy Commission local government programs. (112 requested)



Other Requests (quoted exactly as written on survey):

- Data logging power meter for municipally operated heavy industrial uses (e.g. waste water treatment plant, water well sites.)
- Information on micro-turbines and how they can be used at water treatment plants.
- Would like to see assistance in cogeneration projects (i.e. using methane from wastewater treatment process to generate energy for wastewater treatment plant).
- Cost saving efficiencies in waste water treatment and pumping.
- HVAC replacement and water/wastewater energy efficiency upgrades.

APPENDIX A

California Energy Commission

Light Emitting Diode (LED) Traffic Signal Survey

1. Name of City that you serve :
-OR-
 Name of County that you serve

2. Approximately how many traffic signal intersections does your city/county own and maintain (exclude CalTrans intersections)?

NOTE: If your community has no traffic signal intersection, proceed to question 9.

3. Please tell us about your traffic signals by completing the following table.
 Column 1: estimate the number of each module type (Incandescent and LED).
 Column 2: estimate what percentage of each module type are LEDs.

TRAFFIC SIGNAL MODULE TYPE	Column 1 ESTIMATED NUMBER OF EACH MODULE TYPE (indicate N/A if none)	Column 2 ESTIMATED PERCENT OF MODULES THAT ARE LEDs
12 inch red ball		
8 inch red ball		
12 inch red arrow		
Red flasher		
12 inch green ball		
8 inch green ball		
12 inch green arrow		
Green flasher		
12 inch amber ball		
8 inch amber ball		
12 inch amber arrow		
Amber flasher		
Pedestrian Hand & Pedestrian Walking Man	Total count of both:	
Neon Pedestrian		
Other, specify: _____		

4 If you have converted some or all of your traffic signals to LEDs, what has been your experience? Check all that apply.

- ☐ The LED modules have reduced our utility bills
- ☐ The LED modules have reduced our maintenance costs
- ☐ The light intensity of the LED modules is decreasing and we anticipate the need to replace them in _____ years. Estimated age and color of LEDs needing replacement:
- ☐ The LED modules burned out prior to the warranty date. Estimated percentage that have burned out early:
- ☐ Other comments:

5. If you have not converted any or all of your traffic signals to LEDs, what are your plans for converting them in the future (i.e. do you have a schedule to do LED retrofits, what colors/type modules do you intend to install)?

Comments:

6. Who do you purchase your traffic signal modules from?

Company Name:
Contact Person:
Phone No.:

7. What traffic signal module specifications do you use?

- ☐ California Department of Transportation
- ☐ Institute of Transportation Engineers
- ☐ Other:

8. How many of your intersections have a battery backup system?

9. The Energy Commission adopted energy efficiency standards for traffic signal modules and lamps. These standards set minimum efficiencies for products that may be sold in California. They limit sales of new modules and lamps, manufactured on or after March 1, 2003, to certified, energy efficient products (mainly LEDs). Are you aware of the standards?

- ☐ Yes
- ☐ No

10. Are you interested in an Energy Commission loan (currently 3.95% interest rate) to finance energy saving projects, such as LED traffic signals and battery backup systems?

- ☐ Yes
- ☐ No

11. What energy related services or assistance would you like to see the California Energy Commission provide to local governments?

12. Please check any of the following items that you would like us to send you free of cost:

- ☐ Results of the survey
- ☐ Information on Energy Commission programs for local governments
- ☐ Information on Energy Commission loans for LED traffic signals and other projects
- ☐ Energy efficiency standards for traffic signals (Title 20)
- ☐ Energy efficiency standards for buildings (Title 24)
- ☐ Other:
 - ☐ E-mail my requested item(s).
 - ☐ Send my requested item(s) by mail.
 - ☐ Add me to your mailing list for future notification of Energy Commission local government programs.

13. Please provide us with the following information.

Name	
Title	
City/County	
Mailing Address	
Telephone	
E-mail Address	

THANK YOU VERY MUCH FOR TAKING THE TIME TO COMPLETE THIS SURVEY.

Please send your response by **e-mail or fax no later than September 8, 2004** to mbronson@energy.state.ca.us or (916) 654-4304 (fax number only).